



CONSTRUCTION SPECIFICATION FOR STEEL BEAM GUIDE RAIL SYSTEMS

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721.01 SCOPE

This specification covers the requirements for the installation of steel beam guide rail.

721.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

721.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

721.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 501 Compacting

Ontario Provincial Standard Specifications, Material

OPSS 1504 Steel Beam Guide Rail
OPSS 1505 Channel Components for Steel Beam Guide Rail
OPSS 1601 Wood, Preservative Treatment, and Shop Fabrication

Ontario Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 11 - Pavement, Hazard and Delineation Markings

CSA Standards

G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles
W59-18 Welded Steel Construction

ASTM International

A36/A36M-19 Carbon Structural Steel
A780/A780M-20 Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
D4956-19 Retroreflective Sheeting for Traffic Control

721.04 DESIGN AND SUBMISSION REQUIREMENTS

721.04.01 Submission Requirements

The selection of the systems to be installed at each steel beam guide rail location, including the applicable standard drawings for each location, shall be submitted to the Contract Administrator a minimum of 7 Days prior to the first placement.

In addition, a copy of the installation instructions and manufacturer's specifications for proprietary systems shall be submitted to the Contract Administrator prior to system installation.

721.05 MATERIALS

721.05.01 Non-Proprietary Steel Beam Guide Rail

Single rail guide rail panels shall be according to OPSS 1504.

Channel components shall be according to OPSS 1505.

Wooden posts and blocks shall be according to OPSS 1601.

Plastic blocks shall be as specified in the Contract Documents.

Steel sleeves and spacer tubes used in transition treatments to concrete structures shall be fabricated from Schedule 40 galvanized steel pipe.

Steel posts, sleeves, base plates, backup plates, and spacer tubes shall be hot dip galvanized after fabrication according to CSA G164.

Steel posts shall be according to ASTM A36.

Reflectors shall have a minimum reflective surface of 100 x 100 mm; high intensity retroreflective sheeting according to ASTM D4956, Type VII; colour according to OTM Book 11; and flexibility to bend 90 degrees from vertical and self restore.

Steel base plates for shallow culverts shall be according to ASTM A36. All welding shall be according to CSA W59. All welds shall be continuous.

721.05.02 Proprietary Steel Beam Guide Rail

Single rail guide rail panels shall be according to OPSS 1504.

Thrie beam rail shall be as specified in the Contract Documents.

All supplied proprietary components on proprietary systems shall be according to the manufacturer's specifications.

The names of proprietary systems and manufacturers acceptable for steel beam guide rail are listed in Table 1.

Retroreflective sheeting for adherence to galvanized steel posts shall be according to the manufacturer's recommendations.

Sheeting colour shall be according to OTM Book 11.

721.07 CONSTRUCTION

721.07.01 General

Guide rail systems shall be installed plumb and to the alignment and grade as specified in the Contract Documents, regardless of the material encountered.

Tops of wooden posts shall be cut as specified in the Contract Documents and treated with two coats of 2% copper naphthenate wood preservative. Field applied wood preservative that comes in contact with any galvanized components shall be removed immediately.

Acceptable material from posthole excavation shall be used as backfill around posts and compacted according to OPSS 501.

When required, fabricated steel bases shall be installed level and square to the centreline of the roadway.

Cut ends, field drilled holes, and damaged areas of hot dip galvanized coatings on any galvanized component shall be repaired according to ASTM A780.

Flame cutting shall not be permitted.

721.07.02 Acceptable Systems

System names and where applicable, the manufacturer's name, of acceptable systems for steel beam guide rail, roadside and median tender items are specified in Table 1.

System requirements at each installation location shall be as specified in the Contract Documents, according to the convention defined in Table 2.

A system listed in Table 1 that meets the specified system requirements shall be selected and installed as specified in the Contract Documents and the Contractor's submission.

721.07.03 Steel Beam Guide Rail

721.07.03.01 Installation

Steel beam guide rail shall be installed as specified in the Contract Documents.

Steel posts used on steel beam guide rail installations shall use either plastic blocks or routed wooden blocks. Where wooden breakaway posts are required, they shall be installed with wooden blocks.

Different types of plastic and wooden blocks shall not be permitted together within a steel beam guide rail installation.

When a transition to a rigid obstacle is required, the offset block for the channel may be either wood or a pipe sleeve over the connecting bolt. The pipe sleeve shall be 89 mm outer diameter (OD) galvanized steel pipe cut to the required length.

All joints shall be lapped in the direction of traffic.

Bolts shall be tightened to 100 Nm. Bolts for wooden post installations shall be field cut as required to maintain a maximum protrusion of 10 mm beyond the nut. The cut end of the bolt shall be ground smooth with all sharp edges and burrs removed.

In the event of any conflict between the requirements of any proprietary systems and the above requirements, the requirements of the proprietary systems shall govern.

Steel beam guide rail mounting heights shall be measured vertically from the top of the steel beam guide rail.

Steel beam guide rail without channel mounting heights shall be within the following ranges:

- a) 685 to 760 mm during construction and seasonal shutdown.
- b) 685 to 735 mm upon completion of the Work.

Steel beam guide rail with channel mounting heights shall be within the following ranges:

- a) 685 to 785 mm during construction and seasonal shutdown.
- b) 735 to 785 mm upon completion of the Work.

Where curb with gutter is required, steel beam guide rail mounting heights shall be measured:

- a) Vertically at the face of steel beam guide rail when the face of steel beam guide rail is more than 300 mm beyond the back side of the concrete curb.
- b) Vertically at the edge of pavement when the face of steel beam guide rail is 300 mm or less from the back side of the concrete curb.

Type M and Ezy Guard 4 single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 710 to 810 mm during construction and seasonal shutdown.
- b) 760 to 810 mm upon completion of the Work.

Where curb with gutter is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the inside edge of the concrete gutter.

Where sidewalk is required with Type M steel beam guide rail, mounting heights shall be measured vertically at the face of Type M steel beam guide rail.

Type M20 base plated steel posts shall be field cut and field punched to provide Type M steel beam guide rail mounting heights as specified in the Contract Documents.

Type M20 base plated steel posts shall be epoxied as specified in the Contract Documents by an installer certified by the manufacturer's direct representative.

ACP Sentry single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 725 to 825 mm during construction and seasonal shutdown.
- b) 775 to 825 mm upon completion of the Work.

Ezy Guard High Containment single and double-sided steel beam guide rail mounting heights shall be within the following ranges:

- a) 905 to 1005 mm during construction and seasonal shutdown.
- b) 955 to 1005 mm upon completion of the Work.

721.07.03.02 Reflectors

Reflectors shall be installed:

- a) Starting at the fifth post from the approach end of a steel beam guide rail end treatment.
- b) At a maximum interval of every tenth post on tangent.
- c) On curves, as specified in OTM Book 11, Table 4, but not at an interval greater than every tenth post.
- d) Ending on the last post of the steel beam guide rail installation.
- e) On the posts at the four adjacent steel beam guide rail splices at the approach and leaving end of structures.

The reflector shall be fastened to the post using adhesives, bolts and nuts, or screws with reflective surfaces clear above the top of the posts. One-sided reflectors shall be installed on divided highways and two-sided reflectors shall be installed on undivided highways.

721.07.03.03 Steel Beam Structure Connections

Steel beam guide rail shall be connected to new or existing structure walls as specified in the Contract Documents.

721.07.03.04 Adjust Steel Beam Guide Rail

Steel beam guide rail shall be adjusted at locations as specified in the Contract Documents.

Steel beam rail elements, channel elements, and offset blocks shall be disassembled from the posts. Post bolts, washers, nuts and existing steel offset blocks shall be removed and disposed of as specified in the Contract Documents.

Steel beam rail elements, channel elements, wooden offset blocks, and plastic offset blocks, shall be salvaged for reinstallation. Washers from the front face of the existing steel beam guide rail shall not be reinstalled.

Salvaged steel beam rail elements, channel elements, and wooden or plastic offset blocks shall be reinstalled within the mounting height ranges as specified in the Installation clause using new post bolts, washers, and nuts.

For steel post adjustment, the post shall be raised a minimum of 50 mm above the specified height and then driven down to the required depth before the salvaged steel beam guide rail components are reinstalled. When existing steel offset blocks have been removed, new wooden or plastic offset blocks shall be installed. A new hole shall be field punched through the existing post as specified in the Contract Documents.

For wooden post adjustment, a new hole shall be field drilled through the existing post as specified in the Contract Documents. The top of the offset block shall not extend beyond the top of the existing post. When channel elements are being reinstalled, an additional hole shall be field drilled through the existing post as specified in the Contract Documents.

New reflectors shall be supplied and installed as specified in the Reflectors clause. When new reflectors are installed on a wooden post system, the reflector shall be installed on the approach transverse face of the wooden offset block with one edge 12 mm from edge of post.

721.07.03.05 Single Rail Steel Beam Guide Rail, Relocation

Relocation of the single rail steel beam guide rail shall include the dismantling, storage, transportation, and re-installation of steel beam guide rail systems as specified in the Contract Documents.

721.07.04 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

721.09 MEASUREMENT FOR PAYMENT

721.09.01 Actual Measurement

721.09.01.01 Steel Beam Guide Rail Structure Connections

For measurement purposes, a count shall be made of the number of steel beam guide rail structure connections installed.

**721.09.01.02 Adjust Steel Beam Guide Rail, Wooden Posts
Adjust Steel Beam Guide Rail, Steel Posts
Adjust Steel Beam Guide Rail, Steel Posts with Steel Offset Blocks**

Measurement of adjust steel beam guide rail shall be by length in metres along the centreline of the adjusted system from end to end of each steel beam guide rail installation. The length includes all treatments, transitions, connections, and terminal systems.

**721.09.01.03 Single Rail Steel Beam Guide Rail, Relocation
Single Rail Steel Beam Guide Rail with Channel
Single Rail Steel Beam Guide Rail, TL-2, Adjacent to Sidewalk
Single Rail Steel Beam Guide Rail, TL-3
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to 2H:1V Slope
Single Rail Steel Beam Guide Rail, TL-3, Adjacent to Curb and Gutter
Single Rail Steel Beam Guide Rail, TL-4
Single Rail Steel Beam Guide Rail, Double Sided, TL-3
Single Rail Steel Beam Guide Rail, Double Sided, TL-4, Median
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Median
Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Roadside**

Measurement of steel beam guide rail, including relocation, shall be by length in metres along the centreline of the system from end to end of each steel beam guide rail installation. The length includes all treatments and transitions, but does not include terminal systems.

Steel beam guide rail systems that are temporarily surplus and are required for future stages shall be paid for as one relocation for the combined moves into and out of storage, including any off-site storage required due to on-site restrictions.

721.09.01.04 Single Rail Steel Beam Guide Rail, TL-3, Base Plated for Shallow Culverts

Measurement of base plated steel beam guide rail shall be by length in metres along the length of the culvert under the face of guide rail along the roadway.

721.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

721.10 BASIS OF PAYMENT

721.10.01 Steel Beam Guide Rail Structure Connections - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment, and Material to do the work.

- 721.10.02**
- Adjust Steel Beam Guide Rail, Wooden Posts - Item**
 - Adjust Steel Beam Guide Rail, Steel Posts - Item**
 - Adjust Steel Beam Guide Rail, Steel Posts with Steel Offset Blocks - Item**
 - Single Rail Steel Beam Guide Rail, Relocation - Item**
 - Single Rail Steel Beam Guide Rail with Channel - Item**
 - Single Rail Steel Beam Guide Rail, TL-2, Adjacent to Sidewalk - Item**
 - Single Rail Steel Beam Guide Rail, TL-3 - Item**
 - Single Rail Steel Beam Guide Rail, TL-3, Adjacent to 2H:1V Slope - Item**
 - Single Rail Steel Beam Guide Rail, TL-3, Adjacent to Curb and Gutter - Item**
 - Single Rail Steel Beam Guide Rail, TL-3, Base Plated for Shallow Culverts - Item**
 - Single Rail Steel Beam Guide Rail, TL-4 - Item**
 - Single Rail Steel Beam Guide Rail, Double Sided, TL-3 - Item**
 - Single Rail Steel Beam Guide Rail, Double Sided, TL-4, Median - Item**
 - Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Median - Item**
 - Double Rail Steel Beam Guide Rail, Double Sided, TL-5, Roadside - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Table 1
Acceptable Systems for Steel Beam Guide Rail Tender Items

Item (Note 1)	System	Manufacturer
Single Rail Steel Beam Guide Rail		
TL-2, Adjacent to Sidewalk	Type M30 SBGR, Adjacent to Sidewalk	Non-Proprietary
TL-3	Type M20 SBGR	Non-Proprietary
	Type M30 SBGR	Non-Proprietary
	ACP Sentry	Australian Construction Products
	Ezy Guard 4	Ingal Civil Products
TL-3, Adjacent to 2H:1V Slope	Type M20 SBGR Adjacent to 2H:1V Slope, with 2438 mm Long Posts	Non-Proprietary
	ACP Sentry Adjacent to 2H:1V Slope, with 2100 mm Long Posts	Australian Construction Products
	Ezy Guard 4 Adjacent to 2H:1V Slope	Ingal Civil Products
TL-3, Adjacent to Curb and Gutter	Type M30 SBGR, Adjacent to Concrete Curb	Non-Proprietary
TL-3, Base Plated for Shallow Culverts	Type M30 SBGR, Base plated for Shallow Culverts	Non-Proprietary
TL-4	ACP Sentry Thrie Beam	Australian Construction Products
	Ezy Guard 4 High Containment	Ingal Civil Products
Double Sided, TL-3	Type M20 or M30 SBGR, Double Sided	Non-Proprietary
	ACP Sentry, Median	Australian Construction Products
	Ezy Guard 4, Median	Ingal Civil Products
Double Sided, TL-4, Median	Ezy Guard 4 High Containment, Median	Ingal Civil Products
Double Rail Steel Beam Guide Rail		
Double Sided, TL-5, Median	Guardian 5, Median	Gregory Industries
Double Sided, TL-5, Roadside	Guardian 5, Roadside	Gregory Industries
Notes:		
1. TL-"X" refers to MASH Test Level (i.e., TL-3 means MASH Test Level 3).		

Table 2
Contract Drawing Notation

A - General Item Identification	SBGR - Steel Beam Guide Rail
B - Location Attribute	S3 - 3H:1V Slope or Flatter S2 - 2H:1V Slope or Flatter CG - Adjacent to Concrete Curb and Gutter SW - Adjacent to Sidewalk M - Median
C - AASHTO MASH Test Level	2 - MASH Test Level 2 3 - MASH Test Level 3 4 - MASH Test Level 4 5 - MASH Test Level 5
Notes: 1. Steel Beam Guide Rail is noted on the Contract Drawings by AAAA-BB-C (i.e., SBGR-SW-2).	

Appendix 721-A, April 2024 FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Guide rail system locations. (721.07.01)
- System requirements at each location. (721.07.02)
- Steel beam guide rail to be adjusted. (721.07.03.04)
- Single rail steel beam guide rail to be relocated. (721.07.03.05)

General

Various proprietary Steel Beam Guide Rail (SBGR) systems and one non-proprietary system are used as semi-rigid barriers for roadside and median applications.

Table 1 in OPSS 721 lists the names of systems acceptable for the SBGR related items for several applications. The Contractor is given the option of supplying and installing any of the listed systems as specified in the Contract Documents for the appropriate tender item.

SBGR meets the crash test acceptance requirements of AASHTO MASH, except for SBGR with channel used for structure connections.

Additional background information can be found in the Roadside Design Manual (RDM).

Groups of Steel Beam Guide Rail (SBGR) Systems

Steel beam guide rail installations are grouped according to their intended use as follows:

Roadside Barrier	Seven different items can be invoked under this group, based on site conditions and test level requirements (One TL-2, four TL-3, one TL-4 and one TL-5). The RDM includes guidelines for the selection of the appropriate barrier type and test level.
Median Barrier	Three different items, one item per test level (TL-3 to TL-5) can be invoked under this group.
Relocation	One item can be invoked for this.
Adjustment	Three items can be invoked for adjustment of existing SBGR installations.
Structure Connections	SBGR with channel is used for structure connections. Designers should contact the Design Standards Section when there is a need to use other types of structure connections.

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Anchoring of System Ends

Each end of an SBGR system should be anchored by an appropriate end treatment, transition to a different barrier type, end terminal system, or structure / concrete barrier connection in accordance with policies in the RDM and applicable standard drawings.

Designers need to consider how each run of SBGR will be anchored and detail in the contract documents.

Length of Guide Rail Systems

For calculating the appropriate length of need for guide rail, refer to the RDM. As rails are typically 3810 mm long, SBGR installations should have a length that is a multiple of 3810 mm, except where the use of shorter rail connection elements is required in accordance with applicable standard drawings, and rounded to the nearest metre.

Grading

Grading work may be required for some SBGR variations, including foreslopes, shoulder and rounding width requirements, treatments at entrances and intersecting roadways, leaving end, and long span culvert treatments.

Computation and payment should be made under the appropriate grading items.

Type M SBGR Treatments

Various Type M SBGR treatments are available for different applications. The RDM provides further guidance on the available treatments which include:

a) Installations Adjacent to Curb and Gutter and Sidewalks

Type M30 SBGR should be used when installed adjacent to sidewalks and adjacent to curb and gutter in accordance with applicable standard drawings.

b) Type M Transitions

An appropriate Type M transition treatment should be specified when transitioning to SBGR systems with splices located at posts, as follows:

- Where SBGR with channel is used for structure connections, a Type M transition treatment should be specified beyond the length of the structure connection, in accordance with applicable standard drawings.
- When extending existing or adjusted SBGR installations with Type M SBGR, the appropriate Type M transition treatment should be specified in accordance with applicable standard drawings.
- Where new terminal systems are installed adjacent to existing SBGR installations, in accordance with applicable standard drawings.

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c) Installations Adjacent to 2H:1V Slopes

The Type M20 adjacent to 2H:1V slope installation treatment with 2438 mm long steel posts should be used when installing guide rail adjacent to existing embankments with 0.5 m minimum shoulder rounding width adjacent to slopes 2H:1V or flatter, in accordance with applicable standard drawings. The RDM provides further design guidance on the use of 2438 mm long posts.

Where embankment widening is necessary, the designer should ensure that drainage requirements are properly addressed.

d) Installations Over Culverts and Buried Obstacles with Minimal Cover

Long span treatment Type M SBGR may be installed over culverts or other buried obstacles with minimal cover where the length parallel to the roadway centreline is up to 7.6 m, in accordance with applicable standard drawings. Two long span treatments (5.715 m and 7.6 m) are available. Refer to the RDM for guidance on selecting the appropriate treatment.

In addition to long span treatments that are variations of the Type M SBGR, the base plated Type M SBGR may be installed over culverts or other buried obstacles with minimal cover where the length parallel to the roadway centreline is more than 7 m, in accordance with applicable standard drawings. Refer to the RDM for guidance on selecting the appropriate treatment.

e) Installations Requiring Reduced Deflection

Type M SBGR reduced deflection treatment may be installed to shield rigid obstacles that are located 0.9 m from the face of the rail, in accordance with applicable standard drawings and guidance in the RDM.

f) Rock Cut Installations

The rock cut installation treatment should be used if the rock surface is expected to be within the full standard length of post embedment, in accordance with applicable standard drawings. This installation treatment is not necessary where solid rock is not expected to be located within the full standard length of post embedment. Refer to the RDM for further guidance.

g) Leaving End Installations

The Type M SBGR leaving end treatment should only be installed as described in the RDM, and in accordance with applicable standard drawings.

Proprietary Systems

Various systems with different test levels are currently used. The RDM includes guidelines for use of different proprietary systems.

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Adjustment of Existing SBGR Installations

Mounting height tolerances for existing SBGR are specified in OPSS 721. There are three tender items available for adjustment of SBGR. The purpose of these items is to allow for the adjustment of the mounting height of an existing SBGR installation on wooden or steel posts. Generally, adjustment is necessary at locations where the pavement rehabilitation strategy will raise the existing ground elevation adjacent to an existing guide rail installation. An evaluation of the existing guide rail will provide the designer with an inventory of the type of existing guide rail systems as well as existing mounting heights. Existing SBGR installations may consist of the following configurations:

a) **Wooden Posts with Wooden Offset Blocks**

These systems were used primarily in the years prior to implementation of SBGR on steel posts in 1995. When adjusting these systems, the posts remain in their current location, but the offset block and rail (and channel, where necessary) are reinstalled at the new mounting height. There should be approximately 150 mm of space available at top of existing post for adjustment, assuming this is the first adjustment. The evaluation of existing guide rail should determine whether the existing installation can accommodate the proposed change in height.

b) **Steel Posts with Steel Offset Blocks**

Steel post systems have been the most common SBGR configuration since they were first implemented in 1995 mainly due to their relative ease of handling and installation. Steel offset blocks were used exclusively with steel post systems from 1995 through 2002 when the standard was revised to specify routed wooden blocks. When they are adjusted, existing steel post systems with steel offset blocks will be retrofitted with routed wooden or plastic offset blocks. This requires the punching of a new hole in the post to accommodate the wooden or plastic offset block.

c) **Steel Posts with Wooden or Plastic Offset Blocks**

From 2003 through to early 2008, steel post systems were installed exclusively with routed wooden offset blocks. In 2008, plastic offset blocks were introduced as an alternative to the routed wooden offset blocks. Since that time, steel post systems with plastic offset blocks have been the most common SBGR system.

Selection of the appropriate tender item for adjustment of each installation will ensure that the Contractor addresses the specific adjustment requirements of each system configuration.

Tender items for SBGR adjustment include the removal and replacement of existing hardware including bolts, washers, and nuts as well as the installation of new reflectors. For SBGR with steel offset blocks, replacement of the steel offset blocks with plastic or wooden offset blocks is included.

Review of End Terminals and Leaving End Treatments

End terminals and leaving end treatments should be reviewed when existing SBGR systems are considered for adjustment.

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a) End Terminals

Existing end terminals may consist of eccentric loader terminal (ELT) systems or SBEATs.

Replace ELT installations that are greater than or equal to 5 years in age with a new SBEAT system, provided that the ELT is located on tangent or on horizontal curves with a radius of more than 190 m. Where the existing ELT is located on a horizontal curve with a radius of less than 190 m, a steel beam terminal (SBT) should be installed.

Existing SBEAT Systems consist of several different variations on wooden and steel posts. Replace SBEAT System installations on wooden posts with a new SBEAT System. SBEAT Systems on steel posts that are in good condition and are less than 5 years in age may be adjusted.

A Type M transition treatment should be used when replacing existing end terminals with SBEAT or SBT.

If the existing embankment width adjacent to the existing end terminal is not according to applicable standard drawings for the new end terminal, widening should be provided in accordance with applicable standard drawings.

b) Leaving End Treatments

Existing leaving end treatments may consist of buried leaving end treatments or upright “fishtail” ends.

Buried leaving end treatments should be replaced with a standard leaving end treatment when the height of adjacent SBGR is being adjusted. This would require the removal of 16 m of existing SBGR and subsequent installation of at least 4 m of new SBGR for the leaving end treatment.

When replacing an upright “fishtail” end treatment, ensure that the SBGR leaving end treatment extends a minimum of 4 m beyond the obstacle.

Where an existing buried end treatment or upright “fishtail” end treatment is on the leaving end of a SBGR installation located on an undivided highway or at a location on a divided highway where the end of the SBGR is located within the clear zone for opposing traffic, the treatment should be considered for replacement with a crashworthy end terminal (e.g., SBEAT System).

A Type M transition treatment should be used when replacing existing buried leaving end and fishtail end treatments.

Work Zone Installations

Type M SBGR may be used as a barrier system on work zones for stage construction on granular roadway surfaces to provide positive protection between traffic and the work area. When used on work zones, SBGR will usually be required to be relocated for different construction stages.

The system is first specified as a new installation for stage one, then relocated for subsequent stages. The designer should specify whether the system will be ultimately removed or relocated to remain as part of the permanent roadside barrier system at end of project.

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Relocation of the SBGR system to be part of the permanent barrier system of the project after completing the last construction stage is preferred. However, relocation to a permanent location may not be possible. If removal is required after the last construction stage is completed, see CDED B510-4 for design guidance.

Steel beam energy attenuating terminals (SBEATs) should be used as terminal systems on work zone installations. See CDED B732 for design guidance and requirements related to SBEATs for work zone installations.

The SBGR working width needs to be taken into consideration if the barrier will be installed in proximity to excavation protection systems. Refer to the RDM for further guidance.

Structure Connections

SBGR with channel should only be used for structure connections in accordance with applicable standard drawings.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 912.101 to 912.626 Steel Beam Guide Rail System